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of the work has indeed changed, but there exists even a greater need of scientific investigation, and in many more lines than in the early days of the state, and this need will increase as our civilization becomes more complex. We now have state boards, commissions, etc., that make their reports through different channels, but in each of these there are questions without number of a purely scientific character, that find no place in such reports. Such questions should continue to be worked out in our meetings and the results published in our Transactions. The work in botany has changed to the search for or breeding up of plants better adapted to our economic needs, and to combatting injurious parasitic forms. The immediate, usable results of such work would of course be given to the people in bulletins, but the scientific investigations should not be lost. These should find a place in our transactions. In the most ordinary experiment in plant breeding, even one that produces no commercial result of value, often some exceedingly important new facts in heredity are brought to light that should be given publicity. Then there are numberless new developments just ahead of us. What thoughtful person who considers the development in the cement industry, with its almost revolutionary effect on engineering and architectural construction, will dare to say that we have reached the limit of our mineral resources? Yet this is a thing of the present, undreamed of when the Academy was organized. Our clays have only begun to yield their wealth, and in every line we are merely at the beginning of our development of mineral resources. In engineering there is an immense field opening. We, in Topeka, are still buying ten-cent electricity, while the Kansas river is carrying by each day enough of the same article, at two cents, to supply our every need and add greatly to the comfort of living. Irrigation, conservation and control of flood waters, are also problems of the immediate future. There is no lack of room for work for such an organization; indeed, the amount and variety of work pushing to the front is so great as to be almost bewildering. It is clear to me that the Kansas Academy of Science has a greater opportunity to do beneficial work for the state now than it has ever before had, and this opportunity will increase with the years. If the Academy in its new environment can demonstrate its ability and willingness to do this work efficiently and can devise some plan for prompt publication, there need be no question of its success during its second fifty years.

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Botany in Kansas During the Past Fifty Years.

LYMAN C. WOOSTER.

The collecting naturalists of the nineteenth century made the science of botany possible during the twentieth. It was a labor of love on their part, for the enthusiasm engendered by the discovery of new species of plants has sent many a botanist through swamps, deserts and over mountains in the search for specimens. Gray, Torrey, Wood and a hundred other pioneers in this fascinating field of work listed the plants of Europe, America and other continents and published the descriptions of the species in dozens of manuals of botany for the use of students and other naturalists.

The reports of this Academy of Science show in nearly every volume that the botanists of Kansas were deeply interested in doing their part in the work of cataloging the plants of the state.

In volumes I, II, III, V and VII, Prof. J. H. Carruth catalogs 1,437 species, of which 71 were not found east of the Mississippi river. Among those who assisted Professor Carruth in this work were Professors Snow, Hall, Popenoe and several others. In volume VIII, Professor Carruth increases the number of species of plants higher than the mosses in Kansas to 1,473.

The interest aroused in plants through the making of a complete list of the plants of the state, and the description of new species, very naturally led to an interest in the life history of the plants collected. This in turn caused the botanists to place increasing emphasis on the medicinal, textile and food value of plants to man.

In volume X, Prof. and Mrs. W. A. Kellerman furnish an excellent key to the forest trees of Kansas based on the leaves and fruit, and in volume XI, Professor Kellerman gives a key to the Kansas grasses. In the same volume, Prof. W. T. Swingle gives a list of the parasitic fungi of Kansas together with the names of their host plants. In volume XII, Professor Swingle makes corrections to his list of parasitic fungi, and B. B. Smyth corrects Professor Carruth's list and adds some five hundred new names. The revised list contains 1,666 flowering plants, 40 ferns and filicoid plants and 96 mosses. In volume XIII, B. B. Smyth increased these numbers to 1,790 flowering plants, 40 ferns and filicoid plants, 108 mosses, 3 algæ, 7 sapropytic fungi, 1 liverwort and 8 parasitic fungi. To the last must be added 458 parasitic fungi listed in various volumes by Professors Kellerman, Carleton and Swingle. In 1910 and 1912, B. B. Smyth and his wife, Mrs. L. C. R. Smyth, presented to the Academy their completed lists of the plants of Kansas. These await publication, excepting the part listing the sporophytes. Two very important papers on plants were published in volume XIV. One by Prof. A. S. Hitchcock listed the grasses of Kansas, and one by Miss Minnie Reed described with illustrations the mosses of Kansas and furnished a key for their identification. With the presentation of these lists of plants to the Academy the period of intense activity by an enthusiastic band of naturalists came to a close. They did their work well, and their untiring zeal in cataloging the flora of Kansas made the science of botany for our state possible.

While the work of studying and listing the flora of a state is intensely interesting to naturalists, it proved to be just the reverse to the pupils in the public schools and colleges. The naturalists invented and used three hundred and fifty descriptive terms. These were truly Greek and Latin to the boys and girls and they rebelled at the task of learning and applying them. The attempt to force morphological botany on the schools has resulted in failure, and the pupils and teachers were right, for morphological botany has as little juice in it as a sucked orange, and it has by itself almost no educational value.

But studies of the external and internal anatomy of plants worth knowing, of the functions of their important parts, of plant habits and plant diseases, taken in connection with studies of plant embryology and plant development, are all intensely interesting to pupils and teachers. By plants worth knowing is meant those plants that have informational, æsthetic, industrial, medicinal or food value. The older botanists paid little attention to the usefulness of plants to people, but were content when they had described the parts of a plant, had found its name and had noted its habitat.

The new botany received increasing attention in the later volumes of our Transactions. In volume XVIII, B. B. Smyth describes 307 plants, giving their medicinal values. In volumes X to XXVII, Prof. L. E. Sayre contributed many papers on plants, giving chiefly their medicinal values. Prof. J. T. Willard and others of the Agricultural College have presented papers at nearly every meeting in recent years on crops and their feeding value.

It would be impossible to give in this brief summary of papers on botany even a brief description of other papers read by members of the Academy, but the titles of a few of them will show their trend: "The Native Plants of Kansas Adapted to Cultivation," by Grace R. Meeker; "The Rusts of Kansas," by Elam Bartholomew (154 species and their hosts, volume XVI); "The Development of Our Knowledge of Bacteria During the Past Fifty Years," by Frank U. G. Agrelius, retiring president of the Academy; "The Scientist on the Farm, and Origin and Development of Plant and Animal Instincts," by L. C. Wooster; and numerous references in papers and addresses to plant evolution, plant pests, plants for ornamentation and shade, plant tissues in the arts, and plants as manufacturers of foods for animals, including man.

Formal studies in the schools and colleges are rapidly giving way to studies with valuable content, content that will function in the after experiences of the boys and girls. This statement is based on statistics gathered by the U. S. Department of Education and on reports of the discussions at the meetings of the National Education Association. According to these statistics and reports, the number of pupils in high schools studying formal botany, formal zoölogy, formal physiology, formal geography, Latin, algebra and astronomy, is at the present time rapidly decreasing. Colleges throughout the West, at least, are modifying their curricula to meet the present needs of their constituents. Ex-president Charles W. Elliott investigated seventy-five colleges and universities and found that forty-five of them required no Latin for graduation with the degree of Bachelor of Arts. All this means that general culture in science, mathematics and ancient languages is on the wane, and specific culture to meet the actual needs of people is in the ascendency.

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